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Role of design service firms in product innovation

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Abstract

This thesis examines how the services of design firms, which belong to the category of service sector called Knowledge Intensive Business Services (KIBS), contribute to the innovation in the product firms. In this study, I have examined the role played by the design firm IDEO, in the product innovation of a start-up technology firm, a matured technology firm and a matured consumer product firm. The services provided by IDEO satisfy different needs of the product firms in their product innovation. The services of the design firm is useful in showcasing the technology to attract more funding for the startup technology firms and in licensing the new technology to other established firms. For established firms with a strong focus in technology research, the services of the design firms, which have the expertise in the user knowledge, is useful in balancing exploration and exploitation of their technical knowledge. For a firm whose origin is in contract manufacturing, the services of the design firms is useful in its movement upstream along the value chain in establishing its own brand identity in the end.

In this study, I have also observed that the design firms carry out research experiments to explore knowledge in the user domain and to understand new technology. With the increase in the knowledge of the design firms, product firms increase their collaboration with the design firms for product innovation.

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Chapter 1: Introduction

Service sector plays an important role in the total economic activity in OECD (Organization for Economic Co-operation Development) countries accounting for more than 70% of GDP. Service sector firms provide more than 70% employment in most of the OECD countries and their contributions in exports grow at 7% annually (OECD, 2000; Guile & Quinn, 1988). The most common definition of the service sector encompasses all industries except those in the goods-producing sector, which are agriculture, mining, construction, manufacturing and the government sector. Under this definition, service sector include transportation, communication, public utilities, wholesale and retail trade, finance, insurance, real estate, and other personal and business services (Kutscher & Mark, 1983). Around 40% of the top 25 companies, in the Fortune 500 list of companies belong to the service sector. In addition, revenue from services is increasing steadily for several manufacturing companies like General Electric and IBM. However, economists have long classified service sector as the "tertiary" sector, residual after the primary agricultural and the secondary industrial sectors and that of supporting the agricultural and manufacturing sectors. Some of the common misconceptions about the service sector are that the service sector is composed of industries that have very low rates of productivity, are labor intensive and generate low-wage jobs only (Kutscher & Mark, 1983, Dupuy & Schweitzer, 1994). These misconceptions were reflected in many innovation theories developed over the time and have a bias against recognizing innovation in the service sector (Hauknes, 1996). It is only in the past two decades that the role of services in innovation has been recognized. Research literature in the field of service innovation began to emerge, after the "Reverse Product Cycle" theory to explain the innovations in the service sector by Barras (1986).

Miles et al. (Miles et al,. 1995) classified services into business-to-business services and business to consumers. Among the business service categories, there are services related to physical functions like transport, construction and repair and those that are related to information and knowledge functions like computer services, R&D, design services, consultancies including accounting, legal, management etc. The latter is referred to as Knowledge Intensive Business Services (KIBS) because of the highly specialized knowledge required in providing the service compared to the physical functions. This classification helps to view services away from being homogenous and inherently poor in terms of innovation, to a view that highlights diversity. A later study (Howells, 2000, Miles, 2000) classifies the KIBS further into T-KIBS (R&D, Engineering, Design, etc.,) and P-KIBS (accounting, legal, management, professional services etc). The T-KIBS sector is very much like high-technology firms in the manufacturing industry and closely resembles them in terms of R&D activities and innovative intensity. This study is about one type of T-KIBS firms that provides design services to product firms.

This study contributes to the research literature in the field of innovation in the service sector firms. The focus of the study is in the role played by design firms that belong to T-KIBS category in the innovation of the product firms through their services. It is not about the creation of an innovative service like priceline.com's innovative service where the consumer can specify the price he can pay for a ticket. This study also focuses on the research experiments of the design firm in the field of anthropology and ethnography creating knowledge in the user domain and uses that knowledge in the product innovation of their clients. The remainder of this paper is divided into literature review (chapter2), methodology and data collection (chapter3), analysis of data and proposing hypotheses (chapter 4) and conclusion and further research (chapter 5).

Chapter 2: Literature Reviews

In this chapter, I will survey the relevant literature in service sector innovation with a focus on KIBS firms. Section 2.1 describes service innovation. Section 2.2 deals with the emergence of KIBS firms within the service sector and their role as carriers and producers of innovation. In section 2.3, I will survey the literature related to the organizational ability in balancing exploration and exploitation of knowledge.

2.1 Service innovation

Services are typically defined as, "work done by a person or group that benefits another", "useful labor not resulting in a tangible product" highlighting the intangible nature of the service (Gronroos, 1990). The characteristics of services help in understanding how they are different from products and what that might entail for the process of studying service innovation. Some of the peculiar characteristics of service are that they are intangible and perishable. Service is intangible as it will not result in a physical product and perishable because it is produced and consumed at the same time and hence cannot be stored (Hauknes, 1996).

Many scholars, most notably Tether and Metcalfe (Tether & Metcalfe, 2002), Howells and Tether (Howells & Tether, 2001) and Miles (Miles, 1995) describe the heterogeneous nature of the service sector firms along several dimensions like in the educational level of the employees, the application of technology and in the level of interaction between the employees and consumers. There are service sector firms that provide services directly to the consumers or to other businesses. The following section describes one sub-sector of the service sector known as KIBS whose characteristics include heavy use of technology, higher educational level among its employees and conducts research experiments similar to product firms.

2.2 Knowledge intensive business services

The recognition of KIBS as a sub-sector in the service industries started first in the mid nineties as a phenomenon called as “Knowledge intensive economy” (Miles et al, 1995). Knowledge-Intensive Business Services involve economic activities that result in the creation, accumulation or dissemination of knowledge (Miles et al, 1995). KIBS as a service sector has experienced rapid growth over the past 10 to 20 years in the OECD countries. According to Tomlinson, the share of KIBS inputs in the economy increased from 5% in 1970 to 25% in 1990 in the United Kingdom. Firms have begun to depend on service functions from specialized service providers. As a result, productivity and competitiveness of manufacturing firms depend to an increasing extent on the innovativeness of service suppliers. In 2001, the share of R&D expenditure by the service sector firms in the European Union had risen to 13% and in the USA, it was even higher at 35% (Tomlinson, 2000). Services provided through the product-life-cycle have the benefit of offering continuous revenue-stream and require fewer assets than manufacturing (Davies, 2003). Traditional product companies like IBM and Xerox started focusing more on services rather than on products, as services generate more revenue than the products, especially when technology matures and the product becomes a commodity (Chesbrough & Rosenbloom, 2002). The extent of KIBS contribution to the manufacturing sector is available from Wong and He’s study (2002). An average of 27 per cent of KIBS firms’ sales is to the manufacturing firms. Their study indicates that a significant proportion of KIBS firms provide innovation support services to the manufacturing clients and a significant positive association between the innovation intensities of the KIBS firms and their engagement in this innovation support. The remainder of this section deals with KIBS as carriers and producers of innovation.

KIBS as Carriers of Innovation

KIBS firms exploit its network positions as they work for clients that belong to different industries and as a result gain functional knowledge in several industries. They act as technology brokers by applying knowledge gained in one industry to solve problems in another industry (Hargadon, & Sutton, 1997). An example of technology brokering includes home cholesterol tester by IDEO based on existing analytic components combined with CD inject/eject mechanism from consumer products (Hargadon & Sutton, 1997). According to Von Hippel (1988), this process of applying knowledge in one industry to another is one of the sources of innovation. As KIBS firm's client includes firms from very diverse industries, they are in a position to diffuse knowledge by learning from one product firm and using it in another firm.

KIBS as producers of Innovation

Verganti (2003) defines a unique role for the product design firms as brokers of design language who by capturing, recombining and integrating knowledge about socio-cultural models and product semantics in different social and industrial settings help in creating breakthrough new products. He defines design as the integrated innovation of function, which is technology based and form, which is represented by style.

Function (Technology) + Form (style) ➔ User needs

The traditional innovation is either technology push, which is based on the availability of new technology or market pull, which is based on the explicit needs of the customers (Kamien & Schwartz, 1982). Typical market research carried out by the product firms often fails to capture the emerging needs and trends of consumers (Forbes & Weild, 1999). Design driven innovation and user-centered innovation focus on the Product Language or the form factor and implicit user needs (Chayutsahakij & Poggenpohl, 2002). This is the focus of the first part of this study, in

which I attempt to find out why and how different product firms which specialize in functional knowledge ally with the design firms for their knowledge about users to innovate new products.

2.3 Knowledge exploration

In this section, I will review the literature related to exploration and exploitation of knowledge in an organization. Organization research scholars have argued that firms who explore new knowledge are the most innovative (Levinthal & March, 1981). An alternative view (Garud & Nayyar, 1994) from the innovation literature argued that successful innovators accumulate stocks of knowledge over time and mix and match pieces from this stock to create innovation rather than explore completely for new knowledge (Katila, 2004). Lately many research studies, notably March and Tushman & O'Reilly (March, 1991, Tushman & O'Reilly, 1997) highlights the importance of balancing exploration and exploitation for the survival of organizations. According to March, exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, discovery and innovation and exploitation includes such things as refinement, choice, production, efficiency, selection, implementation and execution. Organizations that engage in exploration to the exclusion of exploitation are likely to find that they suffer the costs of experimentation without gaining many of the benefit and results in too many undeveloped ideas. Organizations that engage in exploitation to the exclusion of exploration are likely to find themselves trapped in suboptimal stable equilibrium.

Katila (2004) further divide the knowledge exploration into technical knowledge and user knowledge. Katila argue exploration of new user areas by product firms has a negative relationship with innovativeness of new products. The reason stated for the negative relationship is that the user knowledge is tacit, which is hard to codify for future use and learning about users

takes time compared to exploration in technological area by the product firms. However, for design firms, the core competence is in their ability to understand the users, codify the tacit knowledge in ways that they can store and exploit for future projects. The focus of the second part of this study is in the knowledge exploration in the user domain by design firms and how product firms recognize this knowledge accumulation and increase the collaboration with the design firms for product innovation.

Chapter 3: Research Method

Of the few research studies in the field of KIBS firms' role in the innovation of the product firms, the study by Muller and Zenker (2001), Wong and He (2002) and Macpherson (1997) quantitatively establishes that the interaction between manufacturing and KIBS firms spurs innovation in both the manufacturing and KIBS firms. The aim of this study is to understand the reasons why and how the services of the KIBS firms is important to the innovation of the product firms and the type of research that is carried out in KIBS firms that contributes in the innovation of the product firms. Since qualitative methods are more suitable to uncover and understand what lies behind any phenomenon about which little is yet known (Strauss & Corbin, 1990), I decided to use qualitative methods based on a case study of an appropriate KIBS firm for this study. I followed the Grounded theory approach for its systematic procedures and techniques for analyzing qualitative data and building theory based on the analysis (Strauss & Corbin, 1990).

I chose Palo-Alto based design firm IDEO that provides services mainly in the product and service design to other businesses, as the case-study subject for this study. The main reason I chose IDEO is for the extensive data available about it in the public domain. IDEO's website offers an excellent source of qualitative data about various projects it has executed for its clients in product development. The data includes details about the type of the project like whether the project is for a specific product development or is exploratory in nature, the type of collaboration with the client, and IDEO's perspective on whether the product is a market success or not. For example, the description of the Vectra project executed by IDEO for Hewlett-Packard is as given below:

"*Hewlett-Packard asked IDEO to design the mechanical enclosure for the Vectra Personal Computer, a high-volume product with several configuration options*"

The above description clearly states the actual product, the Vectra PC, and it defines the task for the project, which is the mechanical enclosure for the product. The following example describes the Collective Vision project for Eastman Chemical.

"In the Collective Vision exploration, IDEO and Eastman explored new and ingenious designs with two of the materials Eastman manufactures, copolyester and cellulose. These materials are known but their possible incarnations are far from exhausted. The unique nature and behaviors of these plastics presented exciting opportunities and challenges for IDEO's designers. The exploration was both symbiotic and satisfying and the result celebrates the rediscovery of copolyester and cellulose.

Note: this project was a conceptual exploration. These glasses have not been brought to market and are not available for purchase."

The above description indicates that this is an exploration project, and the product was not available in the market for sale. In addition to the details about the projects executed for their clients, IDEO's website (www.ideo.com) also contains different ethnographic research experiments conducted by IDEO. Numerous articles about IDEO and the interviews by its founders have appeared in several leading business journals and magazines describing the products they designed and various methods used by IDEO for its innovation. I verified the references about IDEO's contribution for a product described in its website by crosschecking with the website of product firms, which have described the involvement of IDEO in the product development and read interviews by the executives of product firms acknowledging the involvement of IDEO in their projects. For example, Procter & Gamble's CEO A.G. Lafley has

acknowledged the services of IDEO for its contribution in P&G's product development in the Home care division in P&G's annual shareholders meeting (Lafley, 2004).

Other leading design firms like Design Continuum, Ziba and Frogdesign also have a rich set of data in their websites (www.designcontinuum.com, www.ziba.com, www.frogdesign.com) about their clients and the type of projects they carried out for them. The services of these firms in the product innovation of other product firms have also appeared in several business magazines. I used this data to verify whether a phenomenon observed within IDEO is unique to IDEO or is it applicable in general to other design firms as well.

I used open and axial coding methods in analyzing the data gathered from the above-mentioned sources (Strauss & Corbin, 1990). For this, I used different color-coded scheme for each category that emerged out of the coding step. For example, I used green color to depict the category that described the importance of design in new product development at product firms and blue color for the category that describes the importance of outside design firm in product development. Some of the data appeared in different categories as they exhibited more than one characteristic. For example, details about P&G appeared in recognizing the design (green) as key for new product innovation as well as in the category that depicts the increased collaboration with the outside design firms (blue). After this, by grouping and linking different categories, I developed individual hypothesis for different phenomenon that emerged at the end of the coding phase.

Chapter 4: Analysis

In this chapter, I will analyze the data collected and present my findings in several hypotheses. In Section 4.1, I will describe the reasons why product firms ally with the design firms for their innovative product development. Section 4.2 describes the research activities being carried out by design firms and how the product firms recognizes the increased innovativeness in design firms and as a result increase their collaboration with them in new product development.

4.1 Why do product firms seek the services of design firms

In this section, I will describe the reasons why product firms seek the services of the design firms for new product development. There are three reasons why product firms seek the services of design firms.

1. To design product prototypes to showcase their technology
2. To climb up the product value chain by adding design to their manufacturing know-how
3. To balance exploration and exploitation by giving more focus to design.

The following sub-sections will describe each of the above-mentioned reasons with an example.

4.1.1 Show casing of new Technology

Oxford dictionary defines technology as “the application of scientific knowledge for practical purposes”. Typically, new technology is the outcome of research activities carried out in R&D laboratories of university and product firms. The new technology can be in the form of raw materials, or production process or concepts and is usually patented by the discoverer. In order to commercialize the new technology, new product(s) that use the new technology need to be developed. For example if it is a raw material, a new product that uses this raw material needs to be developed to commercially benefit from this new material. Showcasing of technology is a proof-of-concept, demonstrating the potential application of new technology by way of product

prototypes, which can be further refined into a new product. 3M, the great innovative company defines innovation (Gundling, 2004) as

Innovation = Invention + Commercialization

Without the commercialization, technological invention is not useful to a firm that developed it.

A typical product firm has enough resources for developing the technology and for developing new products using the technology and successfully marketing them to customers. Often, the technology is developed in centralized R&D laboratories, further refined, and adapted at individual business units for new product development. The development of new technology development in R&D laboratories is either due to the outcome of new scientific breakthroughs based on fundamental research that is carried out internally or at the request of individual business unit for specific product need. If the new technology development is based on a specific request from a business unit, it is ready for commercialization as the application of the technology is well defined. For the new technology development coming from R&D laboratories, new product development is required for successful commercialization. Researchers usually showcase the new technology to business units within the firm to commit resources for new product development. This is one of the difficult steps in the commercialization process, as all new technology competes for resources for appropriate product development. For example, at 3M, it took Spence Silver, the discoverer of the low-adhesive chemical used in post-it notes along with Art Fry a chemist more than a decade from the discovery of the chemical to successful commercialization of the same in the form of post-it notes. Art Fry, a choir member in the church discovered a potential application for the low adhesive when one day he realized the need for some adhesive to secure the piece of paper used as bookmarks for marking songs. Both

Silver and Fry showcased their new technology by building several prototypes and presenting it to various business units, in company gatherings, etc. Finally, a manager in the Commercial Tape division and his boss provided the necessary resources for the product development resulting in the new product, the Post-it notes and it became a successful product for 3M (Nayak & Ketteringham, 2004).

The post-it story highlights the importance of the need to showcase the technology by way of product prototypes even within a matured product firm to commercialize the technology. For small technology firms that do not have organizational capabilities for product development and marketing, and for component firms that do not have the development capability in designing products using the new components, showcasing is critical for the commercialization of the new technology by way of licensing the technology or selling the components to product firms.

I have identified three categories of firms that worked with IDEO to showcase their technology.

a) Showcasing of the new technology by start-up firms
b) Showcasing of the new technology by mature firms
c) Showcasing of an old technology by mature firms

The remainder of this sub-section describes each type with an example firm.

a) Showcasing of the new technology by start-up firms

In this category of firms, I will describe about a start-up firm that worked with IDEO in the development of prototype products using their new technology and later developed one such prototype into a product. Eleksen was founded in the year 1998, when Chris Chapmand and David Sandbach were working on a medical application that required building sensors into a

device. They worked with textile mills to weave conductive materials into the fabric and soon developed the conductive fabric called Elektex. Ekektex is a "smart fabric" that combines conductive fabric structures with microchip technology. However, Eleksen had no experience in product development. In order to seek more funding from venture capitalists, Eleksen had to demonstrate their technology to the world. Eleksen engaged IDEO for this task. IDEO first worked with Elksen to understand the new technology. IDEO then developed prototypes for a keyboard, remote control and a conference phone using their knowledge about consumers, and experience in the development of consumer electronic products. In this case, IDEO also played the role as a manufacturing liaison and helped Eleksen find a manufacturing partner to develop a product from one of the prototypes and manufacture them. IDEO worked with Logitech, the manufacturing partner in developing the keyboard prototype to a fully developed product, the KeyCase for PDA and helped to bring this product and the smart fabric technology to the market. The Industrial Design Excellence Awards (IDEA) given by the Industrial Designers Society of America and sponsored by Business Week every year awarded the Golden award for the Keycase product in 2004 (www.idsa.org). Eleksen was successfully able to license its technology for similar applications to many other product firms and was able to secure more funding from venture capitalists. Thus, IDEO played a significant role in the commercialization of Elektex technology by the development of product prototypes to showcase the technology and later a fully developed product.

b) Showcasing of the technology by mature firms

Firms that belong to this category are those that specialize in the development of non-assembled products. Non-assembled products are products that are not easily noticeable by end users as they are not a product by themselves and are components for assembled products (Utterback,

1994). The innovation by these firms in the functionality of the existing components needs to be showcased because with the increase in the functionality, these components can be used in a wider variety of application than their current use. In this sub-section, I will describe how Intel, the leading producer of computer chips employed the services of IDEO in developing a new family of product prototypes called “Florence concept” using their latest Centrino technology to showcase the potential of the new technology.

Intel developed the second-generation Centrino mobile technology with improved performance in several areas, including better CPU performance, battery life, improved graphics, memory, bluetooth interfaces, Intel HD Audio and I/O interface. With the introduction of the first generation Centrino wireless technology, the number of computers that deployed the wireless technology went up by over 65% in one year. After the introduction of second generation of technology, Intel wanted to demonstrate that their technology had greater potential than just in mobile computers. However to demonstrate the potential application of the new technology, Intel had to develop new products. Since Intel is not a product design company it sought the services of IDEO for developing new product design that harness the power of the new technology. IDEO developed the concept product, the “Florence Concept” that included a Mobile Digital Office with built-in camera and audio for better collaboration, Mobile On-the-Go with a detachable tablet and most importantly Mobile Entertainment providing a consumer electronics experience rather than a computer experience (Thakkar, 2005). These conceptual products won IDEA’s Golden award for design exploration in 2004. Many OEMs and ODMs have already produced notebooks that can be detached as a tablet PC and others are planning to produce mobile entertainment products. IDEO used its knowledge in the user domain combined with its design

strength to come up with these product designs. Though it is too early to tell whether these products are successful in the market, Intel was successful in lining up OEMs and ODMs for developing new products based on their new technology and thus securing potential customers for the new technology. Intel achieved this success with the service of IDEO in designing new prototypes that showcased Intel's second-generation technology.

c) Revival of an old technology by mature firms

This category is very similar to the previous one except the fact that the firms under this category want to find new applications for their existing material that has several existing applications. Eastman Chemical, wanted to explore new application for Cellulose Acetate, which it started producing over fifty years ago. Cellulose Acetate is the basic raw material used in many plastics based products. With growth for this chemical coming to stagnation, Eastman wanted to develop new applications to increase the demand for this material. Eastman signed up IDEO for this task. IDEO with its experience in product design and a deep understanding of the user knowledge designed an innovative eyewear, the conceptual product called "Ensemble". Eastman by closely working with IDEO also learnt about the importance of innovative product design and setup an innovation lab, where it provides material knowledge to product designers to develop new product using Eastman's chemical materials. Though the commercial success of the new eyewear has not yet been realized, Eastman started facilitating other product designers in developing new innovative product, thus increasing the chances for new growth opportunities for the Cellulose Acetate material.

In all the cases described above the firms chose IDEO as an exploration alliance partner for IDEO's services in product design and expertise in exploring knowledge in the user domain. The

firms then look for an exploitative alliance partner that takes the prototype design from IDEO and develops that into a full-fledged product for commercialization of the new technology. The following figure adapted from the work of Rothaemel & Deeds (Rothaermel & Deeds, 2004) summarizes the services of IDEO for various product firms discussed above.

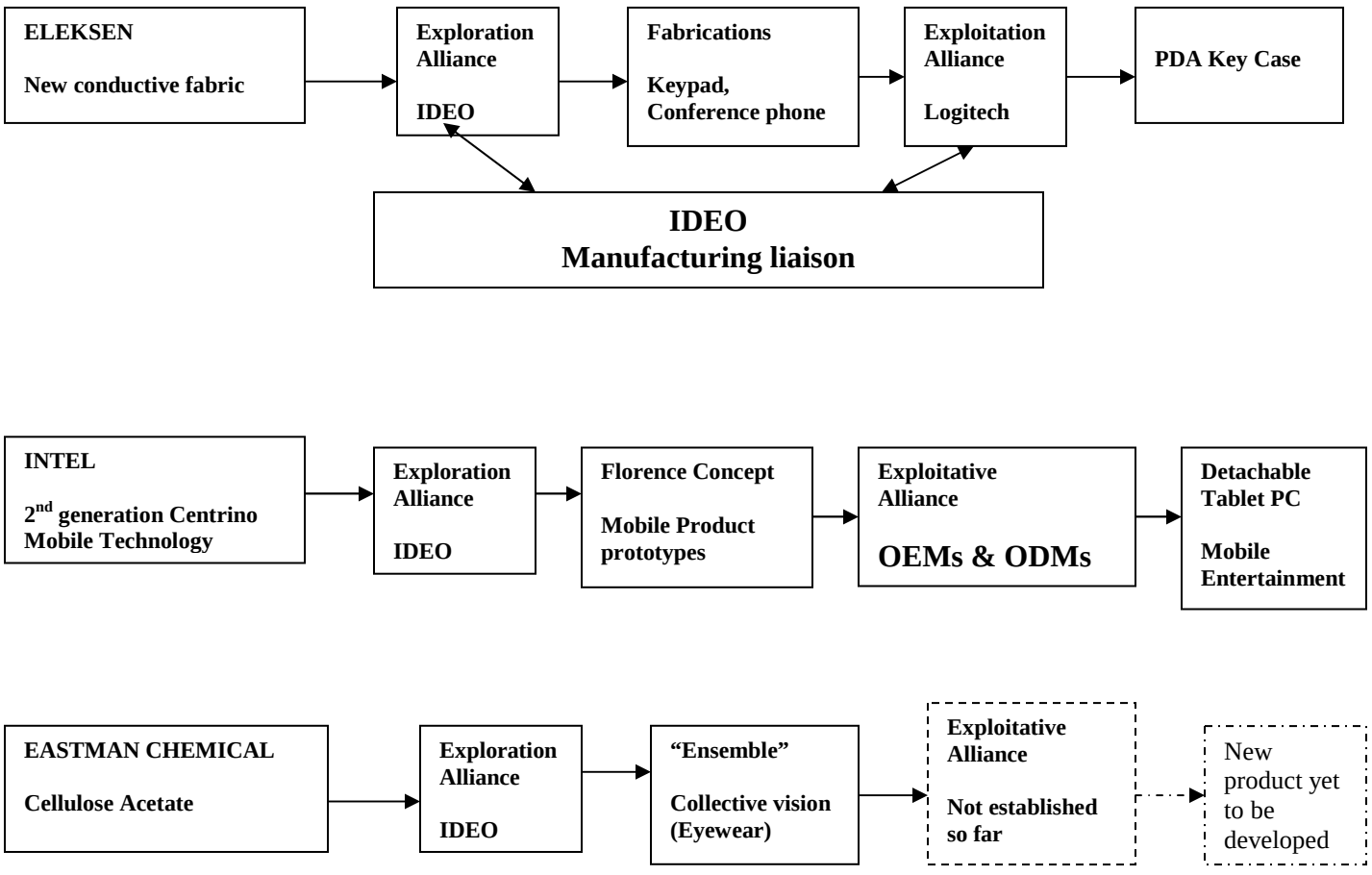

Figure 1 Design firms as Exploration Alliance partner in product innovation

Hypothesis

1. Firms form an exploration alliance with design firms for their services in product design and user research to showcase their technology by developing new product prototypes.

a) Start-up technology firms ally with the design firm to showcase their technology by way of new product prototypes to either license the new technology or to get more funding to develop the technology further.
b) Mature, non-assembled product firms use the services of design firms to showcase their new technology to demonstrate the applicability of their technology to attract potential customers for the new technology.

4.1.2 Climbing up the product value chain - from OEM to ODM to OBM

Original Equipment Manufacturing (OEM) firms manufacture products based on the design given to them by leading technology firms like Apple, H-P, Motorola, etc. OEM firms specialize in efficiently manufacturing products based on the technical specification provided to them, but do not have the technical capability of developing new technology or designing new products by themselves. Original Design Manufacturing (ODM) firms have limited capability in designing new products, which are often low-end commodity products. A commodity product is one in which the basic technology required for the product is matured and hence requires almost no product innovation and the manufacturing process is tuned to manufacture the products in large quantity efficiently. Often brand name product firms like Motorola, uses ODM's services to design and manufacture low-end products under their brand name. This is because they need to get the shelf-space in retail stores that provide a wide range of products from low-end commodity products to high-end state-of-the-art technology products (Businessweek, 2005). Original Brand Manufacturing (OBM) firms are firms that design and manufacture products that are on the leading edge of the technology. Manufacturing firms aspire to move from OEM to ODM to OBM as only OBM firms can command a high price margin for their products based on

the leading edge technology that they develop. This phenomenon of moving from OEM to ODM to OBM is called "Climbing the value chain" (Greenstein, 2005).

Many firms in the East Asian countries follow the "Reverse Value Chain" strategy that was developed by Wong (1999) based on Hobday's work (1995) to move from OEM to ODM to OBM. Under this strategy, firms in the late industrializing countries also called as technology follower countries, start by first mastering simple component sub-contracting or contracting assembly operations, typically on an OEM-subcontract basis, where the end-buyers provide detailed design specification. These firms then move upstream by acquiring product design capabilities and the end-buyers now provide only broad product requirements leaving the design to these ODMs. Some ODMs will further move upstream by focusing on technology development and product design capabilities to become OBM firms. Thus, these firms acquire process innovation first and then develop product innovation capabilities. This is the reverse of the product life cycle model described by Utterback (Utterback, 1994), where the firms first develop product innovation capabilities and then start developing process innovation abilities. Kim (Kim L, 1997) presents an in-depth analysis of how Korean chaebols[1], Hyundai in automotive segment and Samsung in consumer electronics followed this strategy successfully and established their brand names by moving from OEM to ODM to creating their own brands. Forbes and Wield (Forbes & Weild, 1999) describe the importance of design in product innovation in the technology follower countries where most of the OEM and ODM firms are located. To gain the design skills, these OEM and ODM firms turn to design firm's services for both designing new products and in the training of designers. I'll describe in the remainder of

[1] A conglomerate of businesses, usually owned by a single family, especially in Korea.

this sub-section how design firms services' helped Samsung in making the transition from OEM / ODM to OBM .

During 1970's and 1980's the majority of Samsung's resources were channeled into mass productions of low end commodity products like color television, VCRs, microwave ovens and advanced semiconductors like DRAMs. This prevented them from the commitment of resources for development of product design. However, in the early nineties Samsung shifted its strategy from quantity to quality by moving its production offshore and started focusing on product design (Kim Y, 1999). This shift in the strategy was triggered by Samsung's Chairman Lee Kung Hee's visit in 1993 to the retail stores in Los Angeles, where he noticed that Samsung's products were lost in the crowd to Japanese brands like Sony and Panasonic. He soon ordered his managers to focus less on cost saving and more on designing unique products (Businessweek, 2004). In 1994, Samsung hired IDEO to help develop a computer monitor and continued to collaborate with IDEO to explore various design concepts in the consumer electronic product area. Samsung also learned about US consumers and the importance of design by working with IDEO and with other design firms like Design Continuum for various product developments. In 1995, the company did set up its own innovative design lab, an in-house design school, but continued to work with outside design firms for new product development. In the year 2004, Samsung won maximum number of awards more than any other product firm did. In the last five years, Samsung won 19 IDEA awards equaling Apple, the firm that stands out for its excellence in product design. The services of the design firms like IDEO and Design Continuum gave Samsung a starting point in acquiring product design capabilities and Samsung built its own innovation capability subsequently. The following table lists the new product concept

development by IDEO for Samsung. By looking at the last column in the following table, it is clear that Samsung had a very strong alliance with IDEO during its transition period in the mid nineties from OEM/ODM to establishing a brand identity with more focus in product design.

	Project	Category	Description/awards	Date
1	Simple Media	Conceptual Explorations	Computer, television, DVD, fax, and telephone combination	1998
2	Slingshot	Conceptual Explorations	Remote-control concept with touchable LCD screen	1997
3	Syncmaster	Monitors	Flat-screen multimedia monitor	1997
4	TVCR	Conceptual Explorations	TV-VCR combination that was supremely easy to use, stable, and reasonably priced, leading to increased TVCR demand.	1997
5	Kangaroo	Conceptual Explorations	Portable and storable TV/VCR concept	1996
6	TotalMedia	Conceptual Explorations	Adjustable multimedia computer concept for small office / home-office	1995

Source: www.ideo.com

Figure 2 Samsung's alliance with IDEO

Another example of the alliance with the design firms, by OEM/ODM firms to develop design capabilities is Lenovo. The Chinese computer maker Lenovo which acquired IBM’s PC division signed up an alliance with the design firm Ziba to design new products for its Chinese market, in a move that signifies its transition from designing and selling low-end commodity products to recognizing the need for high end product innovation for specifically catering to the Chinese consumers. Ziba started by exploring in user domain to understand more about the cultural, economic, and lifestyle of Chinese consumers and came up with new products that hit the shelves this summer (Business Journal of Portland, 2005).

OEM/ODM firms use another strategy in transitioning to an OBM firm is by acquiring design firms. Flextronics, the Singapore based manufacturing firm acquired the design firms Frogdesign, one of the leading design firms involved in Apple's Mac design, for its design capabilities, to move from OEM/ODM and establish its own brand.

Thus, the design firms play an important role in providing services to OEM / ODM firms in carrying out anthropological, consumer based research and prototype and product design, enabling these firms to design innovative products and establish their own brand identity. For these firms, true product innovation happens after they acquire the design skills and get a deep understanding of the consumers.

Hypothesis 2: Established manufacturing firms that do not have the product design capability, use the services of design firms to move upstream along the product value chain from OEM to ODM to OBM.

4.1.3 Balancing exploration and exploitation by increasing the focus on design

Established Product firms like Procter & Gamble (P&G) work with the design firms to increase the focus of design in their new product development. These product firms have very strong R&D resources and carry out research by exploring in their functional domain and developing new technologies. However if these new technologies are not exploited by developing new products, commercial success is hard to achieve. If there is no commercial success for the output of R&D activities, the input to R&D will go down and as a result the firm will eventually lose out to its competitors. Exploration in the functional areas alone will not result in the commercial success for the firm. Taking the Post-it notes as an example, without the identification of the

application based on the observation of everyday activities for the low-adhesive chemical by Art Fry, this new chemical would have stayed in the shelves of the research labs. What Art Fry found out by observation comes under the category of exploration in the user domain. Exploration in the functional area together with exploration and exploitation of knowledge in the user domain results in new product innovation. Alliance with the design firms provide the necessary expertise in the exploration of user level knowledge and together with the functional level expertise, the product firms can strike a balance between exploration and exploitation that is required for the survival and growth of the firm (Benner & Tushman, 2003). The remainder of this sub-section describes how P&G achieved this balance.

Prior to A.G. Lafley becoming the CEO, P&G had a very strong focus in the research part of R&D and the annual budget often exceeded $200 million for “skunk work” technologies. This resulted in the creation of lots of functional ideas, but very few out of them were developed further as new products and hence commercialization of new technologies was very low compared to the total functional ideas that came out of research. When A.G. Lafley became the CEO, he decided to focus more on design. He said, “I want P&G to become the number-one consumer design company in the world, so we need to be able to make it as part of the strategy”. As part of executing this strategy, Lafley created a design division and kept it outside of the business unit. Under the previous leadership, P&G started a program called “connect & develop” to bring an external focus on innovation. At the beginning, 20% of the ideas for new products came from outside, and it is currently at 35%. Lafley has set a target of 50% for the contribution from outside. With this program, P&G was able to increase their R&D productivity as more ideas were converted to products and plans to increase even further. This he plans to achieve by

pushing for more exposure to the outside world, by establishing a strong relationship with outside designers distributing the product development, to increase “consumer sensing” (Gupta & Wender, 2005).

P&G hired IDEO for a few projects earlier, but after their shift in focus to design and with the emergence of IDEO as a leading innovator in product design and user research, P&G worked more closely with IDEO (Businessweek, 2005). The importance of design and the need to collaborate with outside design firms is more evident in the speech by P&G’s CEO in the annual shareholders meeting in 2004 (Lafley, 2004). In that meeting, A.G. Lafley praised Karl Ronn, the R&D Leader, for his alliance with IDEO

“And he's done outstanding work with IDEO to design products, packaging and consumer experiences that are driving growth in Home Care. P&G Home Care sales have been accelerating over the past few years, and Karl is an important reason why.”

A very similar phenomenon happened at H-P when H-P decided to put more focus on design and user research. A new design division came into existence and H-P labs started working with outside design firms like IDEO for new product development combining the functional knowledge from the research labs with the knowledge in the user domain from the design firms.

Hypothesis 3: Mature product firms with strong capability in the exploration of knowledge in the functional domain, use the services of design firms to explore and exploit knowledge in the user domain to strike a balance between functional and user knowledge research and thereby balance exploration and exploitation necessary for the survival of the firm.

The following figure shows the role of the service firms in helping the product firms strike the balance between exploration in the functional and user knowledge domain and between exploration and exploitation.

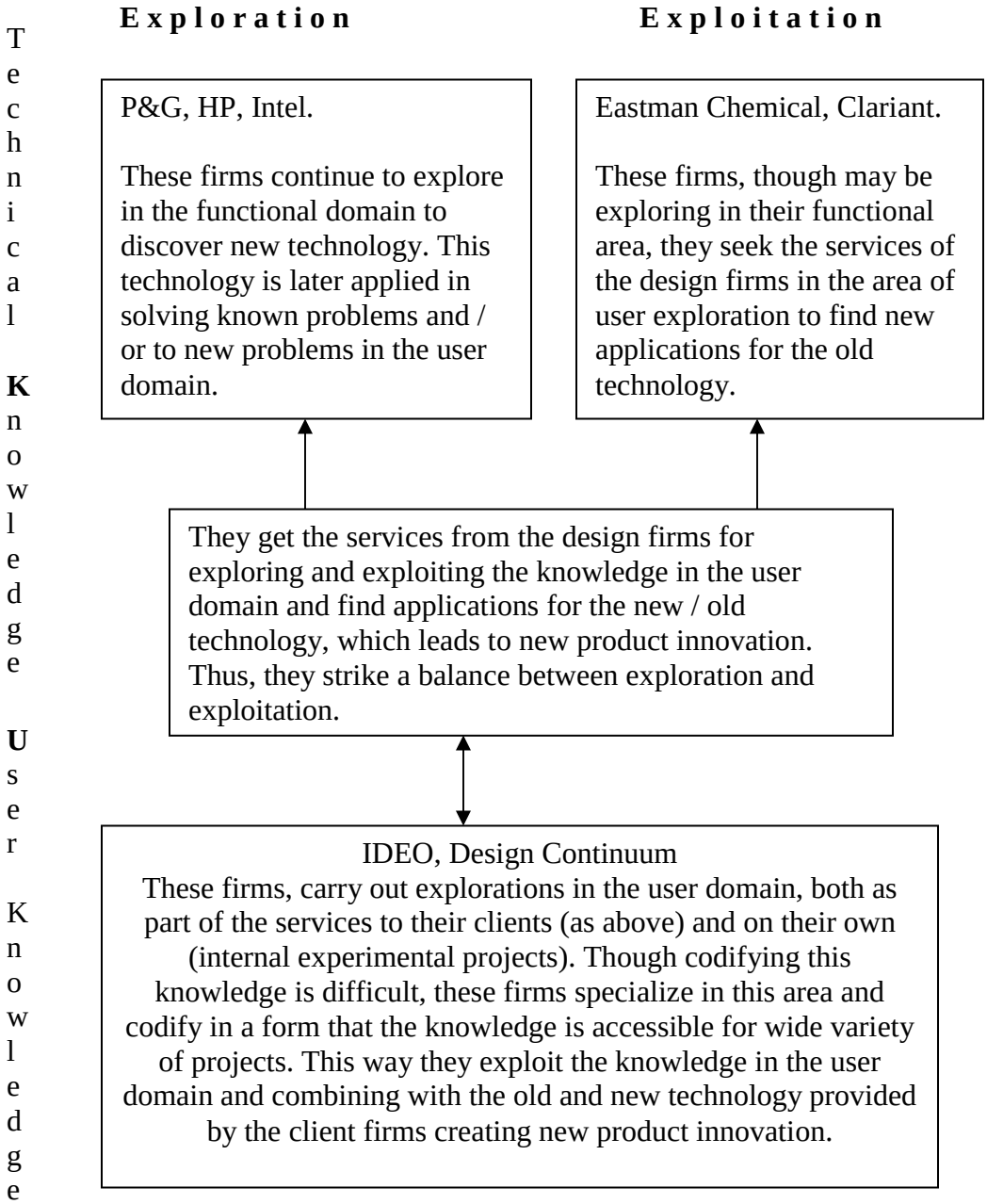

Figure 3 Balancing exploration and exploitation by product firms

The following table summarizes how the services of design firms play an important role in the product innovation of the product firms of different sizes and different industries.

Category	Description	Examples
1. Showcasing a) new applications using new technology	Firms that have discovered a new technology seeks the services of a design firm in designing a new concept product to showcase the potential application to the world.	
I. Start-up Firms	Start-up firms based on a new technology typically do not have resources with the necessary skill-sets to do this on their own. The design firms provide service by designing new product (completely new, or by replacing the old technology) using the new technology.	**Eleksen** – PDA case, **Liquid Metal** – Cell phones without hinges
II. Matured Firms	Matured firms collaborate with design firms to design new products at conceptual level to demonstrate their new technology. They seek alliance with design firms for their complementary skills.	**Intel** - Florence **HP** - Djammer
b) New products using old materials / technology.	Matured firms with a mature material / technology seek the services of design firm to design new products using their materials and technology, by bringing in together the design expertise of the service firms and the material. Successful showcasing of the new products will attract new customers and results in more sales of the old materials.	**Eastman Chemicals** – Eyewear **Clariant** - plastics
2. Climbing up the product value chain OEM to ODM to OBM	Manufacturing Firms in order to move up the product value chain seek the services of design firm for new design, and understanding of consumer needs.	Samsung, Lenovo, Flextronics
3. Balancing Exploration & exploitation	These are firms that focus on “design”, and develop new products by balancing research in functional & user domain	P&G

Figure 4 Reasons why Product firms seek the services of the design firms

4.2 Innovation in KIBS firms and recognition by Product firms

In this section, I will discuss the type of research experiments carried out in design firms that results in the increase of user-based knowledge. With the increase in the knowledge of the design firms, more product firms are working with the design firms. In addition, product firms that have already worked with the design firms have increased their collaboration for more innovative product development. In section 4.2.1, I will describe the research experiments carried out in IDEO and in section 4.2.2, I will present the increased collaboration between IDEO and its clients after the client firms recognize the increased knowledge base and ability to design innovative products.

4.2.1 Research experiments of IDEO

Contrary to the general assumption prevalent in the innovation literature that service firms do not innovate or carry out research, firms that provide service in product design do carryout experimental projects to gain more understanding about implicit user needs and wants, that cannot be easily obtained through market research. Experimentation is well understood in the R&D laboratory, where scientists and engineers test hypotheses and translate their observations into technological possibilities for the company. Experimentation in the context of design means a series of collaborative explorations that yield insight, inspiration and a framework for action (Brown, 2005). The following table briefly describes IDEO's experimental projects carried out over the years. IDEO treats these experimental projects similar to their client projects.

	Project	Category	Description	Date
1	Crave-aid concept	Conceptual Explorations	Concept for skin patch to fight food cravings	2005
2	Heimspiel	Conceptual Explorations	embed technology into everyday life	2003
3	Method Cards	Media &	Collection of 51 cards representing	2003

		Communication	diverse ways that design teams can understand the people they are designing for.	
4	Social Mobiles	Conceptual Explorations	An exploration into how people use mobile phone.	2003
5	Technojewelry	Conceptual Explorations	As part of IDEO's ongoing exploration of the relationship between people and wearable technology, Technojewelry incorporates emerging electronics into everyday attire.	2002
6	Website	Digital interaction	Redesigned internet presence	2002
7	Emotional baggage	Conceptual Explorations	It is a set of conceptual travel products that will let travelers create a personal world in the midst of unfamiliar or inhospitable environments.	2001
8	Without-thought e-fashion	Computers: Desktop	To explore the ways in which we can shape technology and technology can shape us.	2001
9	2010: connected products	Conceptual Explorations	This conceptual products purpose is to show how the businessperson of 2010 can not only cope with intensely increased technological and information presence in their lives, but also improve their work and play experiences via vastly improved access to and control over information.	2000
10	Identity-card exploration	Conceptual Explorations	These concepts explore the complex emotional and societal issues that surround the simple, daily act of exchanging business cards.	2000
11	Tech-box	Strategy	IDEO's knowledge-sharing library and	2000

			intranet website	
12	Without thought	Conceptual Explorations	To observe what people do and feel in their daily lives, and to find solutions that are simple, but which touch the senses and memories shared by people.	2000
13	Shopping cart concept	Conceptual Explorations	Redesign of the shopping cart for ABC's Nightline	1999
14	Chocolate exploration	Conceptual Explorations	Exploration of chocolate candy concepts	1996

Source www.ideo.com

Figure 5 Innovation projects of IDEO - exploration in the user domain

IDEO's research is primarily based on carrying out experimental projects to understand new technology and its potential usage to everyday activities (Heimspiel, Technojewellery and 2010-connected products), to explore user domain for more knowledge about the users (Crave-aid concept, Without thought and Identity card exploration). All the above experiments resulted in product prototypes, which may or may not be directly applicable for future client projects, similar to typical research carried out in R&D laboratories of the product firms. Nevertheless, these research experiments simply provide new insights, such as a novel framework or a new principle, that can constitute a platform for innovation (Brown, 2005). IDEO also carried out research in the process of innovation by developing methods for the codification of the user knowledge, that can be used for future projects across teams located across countries (Techbox and Method cards). Of the 35 projects listed in IDEO's website as greatest hits, 23 of them are after 2000, indicating a positive relationship between the number of experimental projects carried out and successful product development. The remainder of the section describes specific

cases that indicate that the product firms recognizes the increased innovativeness in the design firms and as a result work more closely in a collaborative way in new product innovation.

4.2.2 Increased collaboration between the product firms and IDEO

Product firms work with the design firm for their services for reasons discussed in section 4.1. In this sub-section, I will describe with a couple of examples, where the product firms recognized the increase in the innovation capabilities of the design firms and as a result increased their collaboration with the design firms. The increase in the innovativeness is because design firms carry out more research projects as described in section 4.2.1.

P&G previously worked with design firms mainly for one off projects and in those projects the task of the design firms were well defined, and the design firms were free to come up with innovative product designs within that limit. Crest toothpaste's standing cap is one such project carried out by IDEO for P&G. About four years ago, P&G and IDEO started a more creative and collaborative arrangement, in which they would work together to invent new products, not just to improve on existing ones. Pringles Prints, potato chips with trivia facts printed on them, and Mr. Clean Magic Reach, a wand with a disposable cleaning pad that allows people to clean most of their bathrooms without getting down on their on hands and knees are the results of this collaboration. IDEO and P&G developed these products between 2002 and 2005. Continuing with their increased collaboration, P&G approached IDEO to develop a carpet-friendly sweeper product to join the Swiffer family of products. For this task, P&G engineers and IDEO designers worked together in carrying out user research and for most part were working either at IDEO's office or at P&G's office. This innovative product is the result of exploratory research done in the consumer-based knowledge by observing every day activities at home. For these projects, the

contribution of the design firms was in the area of consumer knowledge and in the development and testing of prototypes. There was more collaboration with the design firms and the product idea came from the design firms and P&G provided technical inputs and developed and refined the technology as defined by the design firms, a greater departure from their previous work with the design firms, where in they were asked for specific design problem.

IDEO's initial project for HP includes the design of a PC case and a laptop computer case; both of them were component designs. Soon IDEO was working more on the new product design, a multifunction device with printer, copier and scanner (CopyJet) in the late nineties. In early 2000, IDEO was working more on innovation strategy (Future Vision project with HP.com), conceptual exploration, wherein IDEO and HP closely worked together for Djammer and Masher conceptual products with HP research labs. Now, IDEO is examining how design can transform HP's product lines by simplifying how the equipment works, distinguishing how it looks and pushing the envelope on what it does. The following table shows the increased contribution from IDEO for HP.

	Project	Category	Description	Date
1	Masher concept	Conceptual Explorations	Working prototype for portable digital DJ console	2005
2	DJammer concept	Conceptual Explorations	Working prototype of new music instrument for DJs	2004
3	Briefing Center	Exhibits & Displays	Branded conference building with an emphasis on "Customer Journey"	2001
4	HP.com Future Vision Project	Strategy	To develop a future vision for HP's internet presence to create a consistent visual brand identity/	2001

5	CopyJet Color Printer / Copier	Product Design	Multifunction device inkjet printer, color copier, and scanner with the goal of offering it at half the cost and twice the throughput copy speed of the nearest competitor's machine.	1999
6	Omnibook 4100	Computers: Mobile	Laptop case design that show resemblance to the existing Omnibook family of products and expands the design language for the future.	1998
7	Clip	Conceptual Explorations	Digitizing clipboard to explore the feasibility of HP's "electronic ink capture" technology	1996
8	Vectra	Computers: Desktop	Mechanical enclosure for the Vectra Personal Computer	1992

Source: www.ideo.com

Figure 6 List of projects by IDEO for HP

IDEO carried out most of its experimental projects starting from the year 2000 (cf. Figure 5). Analyzing the projects carried out by IDEO for established firms like P&G and HP over a period of ten years, there is a notable difference in the type of projects executed before the year 2000 and after that. Most projects executed before 2000 were contractual in nature with the product firms providing specification for components or products and the projects were mainly for extending their existing line of products. These projects did not require any exploration of knowledge in the user domain. However, for most of the projects executed after 2000, exploratory knowledge in the user domain was the basis for the product innovation. In these projects, IDEO designers and the product firms' engineers worked together from carrying out user research through prototype development to product development. This increase in collaboration by product firms with IDEO is due to the increase in IDEO's innovative ability, which they primarily acquired with the execution of experimental projects.

Based on the discussion in this section, it is clear that the KIBS firms do carryout research and thereby increase their innovative abilities and the product firms that seek the services of KIBS firms increase their collaboration with them for more innovative product design.

Hypothesis4: Product firms increase their collaboration for new product innovation with the design firms based on the increased innovativeness of the design firms.

Chapter 5: Conclusions

Research on product innovation is often associated with product firms and hence only very few research study in the field of innovation discusses the contribution by service firms to product innovation. The aim of this study is to understand the role played by the service firms in product innovation. Based on the analysis and the hypotheses presented in section 4, it is clear that design firms contribute to the product innovation of their clients by providing services in product design. The design firms conduct exploratory research in the user domain and create knowledge in that domain, and thus play the role of producers of innovation. They also carry out experimental projects to develop product prototypes using new technology and play the role as consumers of innovation in the technology domain. Product firms increase their alliance with design firms by working closely with them in product innovation.

With the focus on user-centered innovation on the rise, product firms increasingly rely on design firms' services for their expertise in user knowledge. IBM, which is transitioning to a service firm, is doing more research in the user domain. Even Intel, a core technology firm is carrying out researches in the field of anthropology and ethnography (D'Hooge, 2005). Many established product firms like P&G and HP that are known for their knowledge in the functional domain, have started recognizing design as the key to product innovation. As a result, these firms have created a design innovation department that is outside of business units and are collaborating more with the outside design firms. The increase in collaboration with the design firms is likely to reduce new product development cycle and increase R&D productivity in product firms.

Limitation and further research:

Access to the product firms was not available for this study. If it was available, a more quantitative research, which would include the number of new products, success ratio, and R&D productivity improvements on those product developments involved with the KIBS firm, together with this case study approach, could have provided deep insights into the role of the services of the design firms from the perspective of the product firms.

The distinction between service firms and technology firms is disappearing, especially as product firms are moving into services and service firms are starting to focus more on technology. For example, IDEO started investing in technology based product firms like Vocera, a communications company, along with Cisco and Intel. With the growing importance of user-centered and design-based innovation, future study on product innovation should include both the product firms and service firms. Future study in the role of R&D in product innovation should include experiments conducted by the design firms in exploring the user knowledge, that are similar to the R&D projects carried out in product firms. Based on the success story of Samsung in product innovation after it recognized the importance of design, and its collaboration with the design firms, the role of the design firms in the product innovation of the product firms in technology follower countries can be an important research topic.

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